UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

7.24.17

MEMORDANDUM

SUBJ: Summary of New Federal Interagency Estimates of Increased Sea Level Rise

TO: Joel Scheraga; Chair
EPA Climate Change Adaptation Workgroup

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Co-Chairs; Sea Level Rise Working Group

This memo provides an initial report of the Sea Level Rise Working Group.

The Working Group has held five meetings since its creation in March with good participation from EPA program offices, the Office of Research and development, and coastal regions. In addition to considering a range of basic material related to sea level rise, the Working Group reviewed the recent interagency report on sea level rise science published by NOAA in January of this year (see summary of key points below). The Working Group has also developed responses to frequently asked questions on sea level rise (see attached) and is reviewing possible actions that EPA programs might take to respond to challenge posed by rising sea levels.

Key Findings of NOAA Sea Level Rise Report

In January 2017, the National Oceanic and Atmospheric Administration published new projections of sea level rise for the United States developed by an interagency task force made up of Federal agencies including EPA[1]. In general, the report increases Federal agency estimates of the amount of sea level rise expected in future years and provides new information that Federal agencies, States, communities and the private sector can use to prepare for rising sea levels. Some key findings of the NOAA report are:

1 https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf

Scenarios: Global Mean Sea Level Rise By 2100	
Low	0.98 ft.
Intermediate-Low	1.6
Intermediate	3.2
Intermediate-High	4.9
High	6.5
Extreme	8.2

1. **Increase in Estimated Sea Level Rise by 2100:** The report presents a new framework of six scenarios that span the full range, including the upper and lower bounds, of scientifically plausible change in Global Mean Sea Level (GMSL) by 2100 (see box), given assumptions about future greenhouse gas emissions and current scientific uncertainty about the climate response of the Greenland and Antarctic ice sheets.

   The report identifies a new upper bound of GMSL rise plausible by 2100 as 2.5 meters (8.2 feet). This is 0.5m (1.64 feet) higher than the upper bound estimate in the most recent National Climate Assessment (NCA3) from 2014. The lower bound is also increased slightly.

2. **Most Places in the United States Will Experience Greater Sea Level Rise than the Global Average:** For a given amount of GMSL, the Relative Sea Level (RSL) along the U.S. coast will vary by location, due to site-specific factors such as land subsidence, shifting ocean circulation patterns, and geographic variations in response to ice sheet melting. The NOAA report provides RSL values that account for these factors for each of the six GMSL scenarios everywhere along the U.S. coastline, including Alaska and Hawaii, and also for the Caribbean and the U.S. Pacific Island Territories. The attached tables provide estimates of projected sea level rise in different US regions and coastal states and territories. In general:

   - For almost all GMSL rise scenarios, RSL rise is projected to be greater than global average in the Mid-Atlantic, Northeast, and Gulf regions.

   - Only certain locations (the Pacific Northwest and Alaskan coasts), and only for the lower-end scenarios, are projected to experience sea level rise less than the global average, due to land uplift following the retreat of the glaciers at the end of the last ice age.

3. **Higher Sea Level Rise Scenarios, While Low Probability, Are Still Critical for Planning:** The report provides estimates of the probability of the six scenarios under assumptions concerning the future release of greenhouse gases or Representative Concentration Pathways (RCPs) defined by the Intergovernmental Panel on Climate Change (IPCC); see attachment 1 for definition of RCPs. The estimated probability of global sea level rise exceeding 1.5 meters/4.92 feet by 2100 is between 0.4%–1.3% under these RCPs (see attachment 2; fourth chart).

   This low probability should not, however, be taken to mean that these scenarios can be ignored in planning and decision-making processes. Total risk may often be a strong function of low-probability, but high-consequence, outcomes. Best practices in risk assessment and management routinely require consideration of risks at the 1%, 0.1%, or even lower levels (e.g., in floodplain management, reinsurance, nuclear safety, air travel, toxicology). In planning for critical facilities serving larger populations *"where long-term risk management is paramount"* (p. 34) the report recommends defining a "*planning envelope*" with:

- *"a scientifically plausible upper-bound…as the amount of sea level rise that, while low probability, cannot be ruled out over the time horizon being considered; and*

- *"a central estimate or mid-range scenario…as a baseline for shorter-term planning."*

4. **Probability of Higher Sea Level Rise Scenarios May Increase Based on Emerging Evidence:** The probability of the higher-end scenarios depends sensitively on how rapidly the large, land-based ice sheets in Greenland, and especially Antarctica, will melt, and thus how much will melt by 2100, as opposed to over future centuries. This rate of melting, in turn, depends sensitively on dynamical ice sheet processes now the subject of intensive research. The science is progressing quickly in this area, however, with emerging evidence that the Antarctic ice sheets are less stable than previously thought and have the potential to melt much more rapidly than captured in GMSL estimates provided in the NOAA report. The report notes that:

   - *"new evidence regarding the Antarctic ice sheet, if sustained, may significantly increase the probability of the Intermediate-High, High, and Extreme scenarios, particularly for the RCP 8.5 projections…" (p. 21); and*

   - *"growing evidence of accelerated ice loss from Antarctica and Greenland only strengthens an argument for considering worst-case scenarios in coastal risk management." (p. 14)*

5. **New Description of Projected GMSL Rise by Decade:** The report provides estimates of GMSL rise for each of the six scenarios in ten year increments starting in 2010 and ending in 2100 (see table attached). In general, the Low and Intermediate-Low scenario rate of change remains virtually constant decade to decade while the Intermediate to Extreme rates increase more rapidly:

	2020–2030	2080–2090
• Intermediate	2.4 in.	5.5 in.
• Extreme	5.1 in.	16 in.

6. **New Estimates of Continuing Sea Level Rise to 2200:** Even if emissions of greenhouse gases are halted immediately, GMSL will "continue to rise for many centuries" after 2100 (p. 22). The rate of projected sea level rise beyond 2100, however, is very sensitive to the greenhouse gas emission pathway established

during the 21st century. The NOAA report projects GMSL for each of the six scenarios beyond the commonly referenced end-year of 2100, including data points for 2120, 2150, and 2200. The longer horizon estimates are provided to help inform risk assessments related to projects or facilities that have a long service life or expected to remain at a location once established.

	2100	2200
• Low	0.98 ft.	1.27 ft.
• Intermediate	3.2	9.1
• Extreme	8.2	31.8

7. **Increased Frequency of Coastal Flood Warnings:** A key new element of the report is assessment of how the frequency of the coastal flooding that is occurring today might increase in the future. NOAA currently reports a "coastal flood warning" for moderate floods that disrupt commerce and damage private property when waters rise about 2.6 feet above the average daily highest tide. Currently these incidents have a 20% chance of occurrence each year. The report estimates that RSL rise of about 14 inches would result in a 25-fold increase of these flooding events. For example, a 25-fold increase in frequency of these coastal flood warnings is expected in:

    - 2030 in the Intermediate-High scenario;
    - 2040 in the Intermediate scenario;
    - 2060 in the Intermediate-Low scenario; and
    - 2080 in the Low scenario.

Next Steps for Federal Interagency Sea Level Rise Task Force

The Federal interagency task force that developed the new report published by NOAA is continuing to work to improve sea level rise estimates and develop tools to improve ability to conduct coastal risk assessments.

As part of this effort, the Army Corps of engineers has developed and posted to the web a calculator tool that allows users to access the data files supporting the NOAA 2017 report and to generate projected sea levels for specific coastal locations and in time increments of decades for each of the six scenarios addressed in the report. This calculator tool is an important resource in assisting EPA program offices and regions in developing more refined estimates of future sea level rise in terms of place and time horizon. The tool is available at: http://www.corpsclimate.us/ccaceslcurves.cfm

Some topics of additional work of interest to the interagency Sea Level Rise Task Force include:

- integration of the report findings into the regional and sector chapters of the National Climate Assessment (I.e.; NCA4);
- continued close attention to emerging research concerning ice sheet melting in Antarctica and Greenland;
- development of a gridded, flood frequency scenario product, for a range of flood types (from recurrent tidal flooding to storm surge), built from the new scenario data; and
- integration of the new sea-level-rise information with Federal agency efforts to understand future coastal erosion and shoreline change.

New Sea Level Rise Estimates and Tools: Possible Implications for EPA

Development of new projections of RSL and tools to tailor projections to address assumptions related to different types of projects offers EPA the opportunity to identify existing facilities at risk due to sea level rise and to promote actions to reduce risks. This new information can also support assessment of decisions for siting new or expanded facilities in coastal areas. Some of the facility and natural resource types that EPA and its partners might address include:

- Superfund sites;
- Brownfield sites;
- Oil storage facilities;
- Chemical storage facilities;
- Coastal wetlands;
- Commercial clams, oysters, and fish
- Recreational facilities including beaches, boat launches and marinas
- Publicly owned sewage treatment and industrial wastewater treatment plants; and
- Drinking water sources (from salt intrusion into aquifers and saltwater moving upstream)
- Drinking water treatment systems from inundation of facilities.

EPA program offices and Regions are implementing a range of measures to assure that core programs continue to be effective as sea levels rise. Some examples of current EPA actions to respond to sea level rise include:

- The Office of Water is including new NOAA sea level rise estimates in the Climate Resilience Evaluation and Awareness Tool (CREAT) to assist local water utilities in assessing vulnerabilities to climate change and developing response actions;
- The Office of Research and Development is supporting Federal interagency coordination efforts on sea level rise science and tools;

- Region 1 is promoting the New England Environmental Finance Center's Coastal Adaptation to Sea Level Rise Tool (COAST) to raise awareness among coastal cities and towns about the economic impact of sea level rise and storm surge on coastal property and infrastructure;
- Region 2 is working with states to establish SRF criteria for building resistance to climate change impacts, including sea level rise, through infrastructure investment;
- Regions 4 and 6 are promoting the beneficial use of suitable dredged material to support environmentally sound projects to protect from sea level rise and storm surge; and
- Region 9 is supporting the San Francisco Bay Conservation and Development Commission, including the Commission's initiatives to address sea level rise in the San Francisco Bay.

cc: Members; Sea Level Rise Working Group

Attachments:

- Attachment 1: Representative Concentration Pathway (RCP) Descriptions

- Attachment 2: Tables
    - Projected RSL Rise in 2100 by State/Territory by Scenario (feet)
    - Projected RSL Rise in 2100 by EPA Region by Scenario (feet)
    - Projected RSL Rise in 2100 by 4th National Climate Assessment Region by Scenario (feet)
    - Probability of Exceeding GMSL (median value) Scenarios in 2100 for Three Representative Concentration Pathways (RCPs)
    - GMSL Rise Scenario Heights for 19-year Averages Centered on Decade Through 2200

- Attachment 3: Frequently Asked Questions

Attachment 1: Representative Concentration Pathways (RCPs) Descriptions

RCP 8.5 – High emissions

This RCP is consistent with a future with no policy changes to reduce emissions. It was developed by the International Institute for Applied System Analysis in Austria and is characterized by increasing greenhouse gas emissions that lead to high greenhouse gas concentrations over time. This future is consistent with:

- Three times today's CO_2 emissions by 2100
- Rapid increase in methane emissions
- Increased use of croplands and grassland driven by an increase in population
- A world population of 12 billion by 2100
- Lower rate of technology development
- Heavy reliance on fossil fuels
- High energy intensity
- No implementation of climate policies

RCP 4.5 – Intermediate emissions

This RCP is developed by the Pacific Northwest National Laboratory in the US. Here radiative forcing is stabilized shortly after year 2100, consistent with a future with relatively ambitious emissions reductions. This future is consistent with:

- Lower energy intensity
- Strong reforestation programs
- Decreasing use of croplands and grasslands due to yield increases and dietary changes
- Stringent climate policies
- Stable methane emissions
- CO_2 emissions increase only slightly before decline commences around 2040

RCP 2.6 – Low emissions

This RCP is developed by PBL Netherlands Environmental Assessment Agency. Here radiative forcing reaches 3.1 W/m^2 before it returns to 2.6 W/m^2 by 2100. In order to reach such forcing levels, ambitious greenhouse gas emissions reductions would be required over time. This future would require:

- Declining use of oil
- Low energy intensity
- A world population of 9 billion by year 2100
- Use of croplands increase due to bio-energy production
- More intensive animal husbandry
- Methane emissions reduced by 40 per cent
- CO_2 emissions stay at today's level until 2020, then decline to be negative in 2100
- CO_2 concentrations peak around 2050, followed by decline to @400 ppm by 2100

ATTACHMENT 2: Tables

Projected RSL Rise in 2100 by State/Territory by Scenario (feet)

States and Territories	Low* (0.3 m/ 0.98 ft)	Intermediate-Low* (0.5 m/ 1.64 ft)	Intermediate* (1.0 m/3.28 ft)	Intermediate-High* (1.5 m/4.92 ft)	High* (2.0 m/ 6.5 ft)	Extreme* (2.5 m/ 8.20 ft)
Alabama	1.40ft	1.82	3.81	6.00	8.31	10.32
Alaska	0.03	0.35	2.00	4.06	6.46	8.34
American Samoa	1.55	2.02	3.98	6.13	8.34	10.15
California	1.01	1.47	3.33	5.60	8.16	10.09
Commonwealth of the Northern Mariana Islands	1.18	1.65	3.86	6.28	8.64	10.41
Connecticut	1.46	1.93	4.21	6.40	9.06	11.16
Delaware	1.62	2.09	4.31	6.54	9.17	11.22
District of Columbia	1.55	2.01	4.20	6.45	9.01	11.05
Florida	1.27	1.71	3.72	5.98	8.36	10.34
Georgia	1.42	1.85	3.87	6.17	8.65	10.58
Guam	1.25	1.71	3.90	6.30	8.65	10.47
Hawai'i	1.35	1.83	4.03	6.44	8.96	10.94
Louisiana	2.93	3.36	5.37	7.57	9.90	11.91
Maine	1.16	1.61	3.89	6.05	8.79	10.87
Maryland	1.63	2.09	4.30	6.55	9.14	11.19
Massachusetts	1.38	1.83	4.12	6.33	8.99	11.13
Mississippi	2.20	2.64	4.61	6.80	9.12	11.13
New Hampshire	1.13	1.56	3.84	6.03	8.72	10.83
New Jersey	1.60	2.08	4.33	6.54	9.20	11.26
New York	1.49	1.96	4.24	6.43	9.10	11.19
North Carolina	1.59	2.05	4.20	6.56	9.14	11.14
Oregon	0.77	1.20	2.95	5.19	7.78	9.74
Pennsylvania	1.50	1.96	4.20	6.40	9.02	11.08
Puerto Rico	1.13	1.59	3.55	5.91	8.29	10.17
Rhode Island	1.43	1.89	4.17	6.37	9.01	11.14
South Carolina	1.44	1.88	3.92	6.25	8.76	10.70
Texas	2.27	2.72	4.74	6.95	9.30	11.27
United States Virgin Islands	1.13	1.60	3.55	5.92	8.28	10.20
Virginia	1.66	2.13	4.32	6.61	9.19	11.23
Washington	0.51	0.91	2.61	4.80	7.39	9.38

*Note that the sea-level-rise scenarios do not include vertical land movement (VLM), whereas state estimates do reflect VLM. Therefore, average values for states may be higher or lower than scenarios due to local variations in VLM.

Projected RSL Rise in 2100 by EPA Region by Scenario (feet)

EPA Regions	Low* (0.3 m/ 0.98 ft)	Intermediate-Low* (0.5 m/1.64 ft)	Intermediate* (1.0 m/3.28 ft)	Intermediate-High* (1.5 m/4.92 ft)	High* (2.0 m/ 6.5 ft)	Extreme* (2.5 m/ 8.20 ft)
Region 1	1.33 ft	1.79	4.07	6.26	8.94	11.05
Region 2 (Continental)	1.55	2.02	4.29	6.49	9.15	11.23
Region 2 (Caribbean)	1.13	1.59	3.55	5.91	8.29	10.18
Region 3	1.62	2.09	4.29	6.55	9.14	11.19
Region 4	1.42	1.87	3.91	6.19	8.63	10.61
Region 6	2.54	2.98	5.00	7.20	9.55	11.53
Region 9 (Continental)	1.01	1.47	3.33	5.60	8.16	10.09
Region 9 (Hawai'i and Pacific Islands)	1.34	1.82	3.99	6.36	8.81	10.72
Region 10 (Continental)	0.61	1.02	2.74	4.95	7.54	9.52
Region 10 (Alaska)	0.03	0.35	2.00	4.06	6.46	8.34

*Note that the sea-level-rise scenarios do not include vertical land movement (VLM), whereas regional estimates do reflect VLM. Therefore, average values for regions may be higher or lower than scenarios due to local variations in VLM.

Projected RSL Rise in 2100 by 4th National Climate Assessment Region by Scenario (feet)

Fourth National Climate Assessment Regions	Low* (0.3 m/ 0.98 ft)	Intermediate-Low* (0.5 m/1.64 ft)	Intermediate* (1.0 m/3.28 ft)	Intermediate-High* (1.5 m/4.92 ft)	High* (2.0 m/ 6.5 ft)	Extreme* (2.5 m/ 8.20 ft)
Northeast	1.46 ft	1.92	4.18	6.39	9.04	11.13
Southeast	1.62	2.07	4.13	6.41	8.86	10.85
US Caribbean	1.13	1.59	3.55	5.91	8.29	10.18
Southern Great Plains	2.27	2.72	4.74	6.95	9.30	11.27
Southwest	1.01	1.47	3.33	5.60	8.16	10.09
Northwest	0.61	1.02	2.74	4.95	7.54	9.52
Hawai'i and Pacific Islands	1.34	1.82	3.99	6.36	8.81	10.72
Alaska	0.03	0.35	2.00	4.06	6.46	8.34

*Note that the sea-level-rise scenarios do not include vertical land movement (VLM), whereas regional estimates do reflect VLM. Therefore, average values for regions may be higher or lower than scenarios due to local variations in VLM.

Probability of Exceeding GMSL (median value) Scenarios in 2100 for Three Representative Concentration Pathways (RCPs) (based upon Kopp et al.; 2014)

GMSL Rise Scenario	RCP2.6	RCP4.5	RCP8.5
Low (0.3 m/0.98 ft.)	94%	98%	100%
Intermediate-Low (0.5 m/1.64 ft.)	49%	73%	96%
Intermediate (1.0 m/3.28 ft.)	2%	3%	17%
Intermediate-High (1.5 m./4.92 ft)	0.4%	0.5%	1.3%
High (2.0 m/6.5 ft.)	0.1%	0.1%	0.3%
Extreme (2.5 m/8.20 ft.)	0.05%	0.05%	0.1%

GMSL Rise Scenario Heights for 19-year Averages Centered on Decade Through 2200 (showing only a subset after 2100; initiating in year 2000; only median values are shown; feet)

Years	Low* (0.3 m/ 0.98 ft)	Intermediate-Low* (0.5 m/1.64 ft)	Intermediate* (1.0 m/3.28 ft)	Intermediate-High* (1.5 m/4.92 ft)	High* (2.0 m/ 6.5 ft)	Extreme* (2.5 m/ 8.20 ft)
2010	0.10ft	0.13	0.13	0.16	0.16	0.13
2020	0.20	0.26	0.33	0.33	0.36	0.36
2030	0.30	0.43	0.52	0.62	0.69	0.79
2040	0.43	0.59	0.82	0.98	1.18	1.35
2050	0.52	0.79	1.12	1.44	1.77	2.07
2060	0.62	0.95	1.48	1.97	2.53	2.95
2070	0.72	1.15	1.87	2.59	3.28	3.94
2080	0.82	1.31	2.33	3.28	4.27	5.25
2090	0.92	1.48	2.79	3.94	5.58	6.56
2100	0.98	1.64	3.28	4.92	6.56	8.20
2120	1.12	1.97	4.27	6.56	9.19	11.81
2150	1.21	2.40	5.91	10.17	14.11	18.04
2200	1.28	3.12	9.19	16.73	24.61	31.82

*Note that the sea-level-rise scenarios do not include vertical land movement (VLM), whereas regional estimates do reflect VLM. Therefore, average values for regions may be higher or lower than scenarios due to local variations in VLM.

Attachment 3: Sea Level Rise Frequently Asked Questions

1. Why is sea level rising? What is contributing to sea-level rise?

Globally, sea-level rise is due to two main factors: thermal expansion of the oceans and increased melting of land-based ice. Warming of the atmosphere caused by greenhouse gas emissions drives both of these processes.

As water warms it expands (hence, thermal expansion) and the vast volume of the oceans means that even a little warming can lead to measureable sea-level rise.

Melting ice, such as glaciers and ice sheets, adds water mass to the oceans. The melting of ice results from both warmer air temperatures and warmer ocean waters. Roughly one-third of the sea-level rise observed to date is due to thermal expansion, while the other two-thirds is attributable to water being added to the oceans.

2. What are the historic rates of sea level rise? How are rates measured?

Global sea-level rise through most of the 20th century averaged 1/16 Inch per year (1.7 mm per year); the rate since 1993 is 1/8 inch per year (3.2 mm per year). Between 1993 and 2014 sea level rose 2.6 inches (67 mm).

Satellite laser altimeters are used to measure the average global sea-level height, while tide gauge stations are used to measure local sea levels relative to a specific point on land.

3. What is the difference between Global Mean Sea Level (GMSL), Relative Sea Level (RSL) and Mean Higher High Water (MHHW)?

Global Mean Sea Level (GMSL) is defined as the height of the water above the center of the Earth; changes to GMSL are related to water volume changes alone. Relative Sea Level (RSL) incorporates vertical land movements and other non-climatic factors (land subsidence, upstream flood control, erosion, regional ocean currents, variations in land height, and whether the land is still rebounding from the compressive weight of Ice Age glaciers) into the sea-level changes observed at a given location.

For example, if land is subsiding at the same time sea level is rising, the net result is a local sea level that is rising faster than the global average. Conversely, if the land is rising faster than sea level, the net result is an apparent local sea-level fall. In other words, the sea surface is not rising at the same rate in all locations around the globe.

Tides cause local sea level to vary on a daily basis, but not all high tides are the same. Mean Higher High Water (MHHW) is the average water height during the highest tides.

4. How is El Niño related to sea-level rise?

Trade winds blowing from east to west usually cause warm water to "pile up" in the Western Pacific near Australia and Indonesia. During an El Niño event the trade winds weaken and the water starts to flow eastward towards South America. Furthermore, in the Eastern Pacific thermal expansion causes sea water to increase in volume. The combination of west-to-east water movement and temperature changes can cause sea level along the West Coast to rise nearly 8 inches over a few seasons, with the largest seasonal effects happening during peak El Niño months in the fall and winter.

5. What are the economic impacts of sea-level rise?

Coastal areas face increased risks to their transportation and port systems, real estate, fishing, tourism, small businesses, power generating and supply systems, other critical infrastructure (such as water supply and treatment facilities, hospitals, schools, and police and fire stations), and countless managed and natural ecosystems.[1] *While economic impacts can vary considerably by location, adaptation measures can preempt or delay some of the worst impacts of sea-level rise.*

*A 2015 report by EPA found "*Without adaptation, unmitigated climate change is projected to result in $5.0 trillion in damages for coastal property in the contiguous U.S. through 2100 (discounted at 3%). Protective coastal adaptation measures, such as armoring shorelines, significantly reduce total costs to an estimated $810 billion." *(see: https://www.epa.gov/cira/climate-action-benefits-coastal-property#findings).*

Planning options include accommodation/learning to live with increasing sea level, hard and soft protection measures (like sea walls and living shorelines, respectively), and relocation away from the areas of inundation.

6. What tools exist to examine risk related to sea-level rise?

To find tools useful for examining the risk related to sea-level rise, visit https://toolkit.climate.gov. Select "Tools" at the top of the page, then go to "filter by topic" and choose "Coasts." You can further refine your search with the "Filter by tool function" drop-down menu.

Example resources available through this site are:

- *the "National Assessment of Coastal Vulnerability to Sea Level Rise,"*
- *"Flood Resilience: A Basic Guide for Water and Wastewater Utilities,"*
- *"Keeping Pace: A Short Guide to Navigating Sea-Level Rise Models and the GIS-based "Coastal Resilience" toolkit offered in partnership between The Nature Conservancy and Microsoft.*

7. **Where can I find more information about options for adapting to sea-level rise? What have other states/municipalities been doing to protect their coasts against sea-level rise?**

   To learn more about what state and local governments are doing to protect their coasts against sea-level rise, visit https://toolkit.climate.gov. select "Case Studies" at the top of the page, then go to "filter by climate threat/stressor" and choose "Sea level rise/storm surge/coastal flooding."

   Some examples of case studies include:

- *how staff at the Maryland Department of Natural resources used the Sea Level Affecting Marshes Model (SLAMM) to identify high-priority conservation areas that allow for wetland migration and future wildlife habitat;*
- *how the city of Houston combined federal, state, municipal and non-profit resources in a project to plan for climate resilience;*
- *how Charleston, South Carolina is taking steps to deal with "nuisance flooding" and prepare for sea-level rise; and*
- *how the Quinault community in Oregon is developing a plan to relocate the lower village of Taholah to higher ground.*